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Physical Therapists' Perceptions of Telephone- and Internet Video-Mediated Service Models for Exercise Management of People With Osteoarthritis

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<<st2>>ORIGINAL ARTICLE

<<rrh>>Therapist Perceptions of Remote Service Delivery for OA

<<lrh>>Lawford et al

<<title>>Physical Therapists' Perceptions of Telephone- and Internet Video-Mediated Service Models for Exercise Management of People With Osteoarthritis

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Objective. To investigate physical therapists' perceptions of, and willingness to use, telephone- and internet-mediated service models for exercise therapy for people with knee and/or hip osteoarthritis.

Methods. This study used an internet-based survey of Australian physical therapists, comprising 3 sections: 1 on demographic information and 2 with 16 positively framed
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perception statements about delivering exercise via telephone and video over the internet, for people with hip and/or knee osteoarthritis. Levels of agreement with each statement were evaluated. Logistic regression models were used to determine therapist characteristics influencing interest in delivering telerehabilitation.

Results. A total of 217 therapists spanning metropolitan, regional, rural, and remote Australia completed the survey. For telephone-delivered care, there was consensus agreement that it would not violate patient privacy (81% agreed/strongly agreed) and would save patient's time (76%), but there was less than majority agreement for 10 statements. There was consensus agreement that video-delivered care would save a patient's time (82%), be convenient for patients (80%), and not violate patient privacy (75%). Most agreed with all other perception statements about video-delivered care, except for liking no physical contact (14%). Low confidence using internet video technologies, and inexperience with telerehabilitation, were significantly associated with reduced interest in delivering telephone and/or video-based services.

Conclusion. Physical therapists agree that telerehabilitation offers time-saving and privacy advantages for people with osteoarthritis and perceive video-delivered care more favorably than telephone-delivered services. However, most do not like the lack of physical contact with either service model. These findings may inform the implementation of telerehabilitation osteoarthritis services and the training needs of clinicians involved in delivering care.

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<<hd1>>INTRODUCTION

Osteoarthritis (OA) of the knee and hip affects around 24% and 11% of the population, respectively (1), and together are the eleventh highest contributor to global disability (2). With the aging population and increasing rates of obesity, the prevalence of OA is projected to increase substantially over the coming decades (2,3). To meet the rising public health burden, accessible and effective models of health care are needed. In this digital age, delivery of health care services via technology presents new possibilities for the future of chronic disease management (4,5).

<<significance&innovations>>

SIGNIFICANCE & INNOVATIONS

- Remotely delivered health care (telerehabilitation) can increase the accessibility of physical therapy services for people with hip and/or knee osteoarthritis (OA), and increasing evidence supports the efficacy of such service delivery models, yet few are implemented beyond the research setting.
- Although people with hip and/or knee OA are willing to use telephone- and internet video-mediated service models, how physical therapists view such remotely-delivered care for this patient group is unknown, as well as whether physical therapists would be willing to deliver clinical care this way.
- Most physical therapists agree that both modes of care would save patients time and maintain patient privacy but have concerns about the lack of physical contact when consulting via telephone or video over the internet.
- Physical therapists favored internet video technologies rather than the telephone to deliver care.

Meta-analyses show exercise improves pain and physical function in people with OA (6,7). Clinical guidelines universally advocate exercise as an essential component of management of people with hip and knee OA (8), yet uptake of exercise is low (9–11). For people with OA, exercise advice is typically provided by physical therapists, and of all allied health professionals in Australia, general practitioners most frequently refer patients with OA to physical therapists (12). However, many people experience significant challenges accessing physical therapy services (13–16), including difficulties obtaining referrals or appointments, long waiting times (17,18), and limited availability of care in some regional or remote areas (19). People with knee OA who have difficulties accessing appropriate health care often delay seeking care (20), possibly to the detriment of their symptoms. New models of physical therapy service delivery that are accessible to the wider population are needed.

Telerehabilitation is the remote provision of rehabilitation services using telecommunication technology and is supported by the Australian Physiotherapy Association (21) and American Physical Therapy Association (22) as an alternative model of service delivery.

Telerehabilitation services may improve access to specialist advice for exercise management by allowing patients to consult with a physical therapist from their own home or workplace, in turn potentially reducing the costs associated with attending clinics in-person (e.g., travel, car parking, loss of earning during travel time to/from appointment, etc.). There is evidence

that telerehabilitation using sophisticated videoconferencing software produces similar physical activity and functional outcomes to conventional face-to-face care in people after knee arthroplasty (23). Given that 94% of Australian households owned a computer and 86% had high-speed internet access in 2015 (24), and that software such as Skype and FaceTime are freely available, internet videoconferencing services offer potentially affordable and accessible ways in which people can consult with physical therapists to receive exercise advice. A recent Australian clinical trial has shown that exercise delivered by physical therapists via Skype, in combination with a web-based pain coping skills program, improves pain and function in people with knee OA compared to internet-delivered educational material (25). There is also preliminary evidence of the effectiveness of telephone-delivered care for people with knee OA (26). Furthermore, the UK-based telephone service PhysioDirect (initial assessment and advice from a physical therapist prior to face-to-face therapy) is equally as clinically effective as usual physical therapy care (waiting list for face-to-face physical therapy treatment) for people with musculoskeletal conditions and provides faster access to care (27).

Although consumers with hip and/or knee OA hold positive views, and are willing to use, telephone- and internet-video-mediated physical therapy service models (28), there are few such services available outside of the research setting. For service providers and/or policy makers to effectively implement such clinical services, it is important to understand whether these models of service delivery would be acceptable, or unacceptable, to the clinicians who would deliver care. The limited research to date has investigated the perceptions and experiences of physical therapists who were involved in delivering education and exercise in the context of a clinical trial (27,29–31). These small samples of specially trained therapists, experienced in using telerehabilitation, may hold more positive perceptions about its use, which may not necessarily reflect the wider physical therapist population who are largely inexperienced with telerehabilitation. There are no studies investigating the perceptions of a broader sample of physical therapists who may be naïve users of telerehabilitation. Physical therapists typically use physical touch as a way of communicating and connecting with their patients (32–34), and therapists may be uncertain about the usefulness of remote models of service delivery and/or unwilling to implement such models in their clinical setting. Therefore, the aim of this study was to investigate physical therapists' perceptions of, and willingness to use, remotely-delivered service models for exercise management of hip and/or knee OA.

<<hd1>>SUBJECTS AND METHODS

<<hd3>>**Study design and participants.** A descriptive, cross-sectional web-based survey was undertaken. This study was approved by the University of Melbourne Research Ethics Committee. Physical therapists across Australia were recruited between February and August 2016. We wished to obtain a broad sample of physical therapists from rural and metropolitan areas, spanning both private and public practice. As it is not possible in Australia to send surveys directly to the entire population of registered physical therapists, a variety of recruitment strategies were employed to maximize generalizability of the sample. Participants were recruited by national advertisements on social media (Facebook), as well as via the Australian Physiotherapy Association monthly email news bulletin to members, advertising through Australian Physiotherapy Association special interest groups, and the University of Melbourne's clinical and research networks. Finally, physical therapists who had previously volunteered for research studies conducted by the researchers, and who had consented to be contacted for future studies, were also emailed an invitation to participate. Based on previous experience using these recruitment methods, we aimed to obtain at least 200 survey responses. Mandatory fields at the beginning of the survey ensured that only therapists who had current Australian registration and had treated at least 1 patient with hip and/or knee OA in the last 6 months could complete the survey.

<<hd3>>**Survey instrument.** Physical therapists completed a survey via SurveyGizmo about their perceptions of delivering exercise over the telephone and via video over the internet (e.g., Skype, FaceTime) for people with hip and/or knee OA. Prior to completion, participants were provided with an introductory plain language statement detailing the purpose of the questionnaire. The survey (see Supplementary Appendix A, available on the *Arthritis Care & Research* web site at <http://onlinelibrary.wiley.com/doi/10.1002/acr.23260/abstract>) comprised 3 sections. Section A ascertained demographic information (e.g., sex, geographic location of the clinic) and asked about previous experience with telerehabilitation (if any). Sections B and C of the survey were adapted from some statements of the Telemedicine Perception Questionnaire (35) (items 1–10), a valid and reliable measure of perceptions about the risks and benefits of home telemedicine, and also included some custom-developed statements (items 11–16). These additional items were based on the behavior change wheel criteria (affordability, practicability, effectiveness, acceptability, safety, and equity) for designing and evaluating interventions (36). Sections B and C therefore included 16

statements each about delivering an exercise program for people with OA over the telephone (Section B), and via video over the internet (Section C). For consistency, all statements were framed positively, and physical therapists were asked to rate their agreement with each statement on a 5-point Likert scale ranging from strongly agree to strongly disagree. A final custom-developed question ascertained appropriate fees for telephone and video-based consultations relative to conventional consultations, rated on a 5-point Likert scale, ranging from “50% more than the cost of a face-to-face physical therapy session” to “50% less than the cost of a face-to-face physical therapy session.”

Statistical analysis. Data were downloaded from SurveyGizmo and processed in a Microsoft Excel spreadsheet. Data analysis was carried out with the Statistical Package for the Social Sciences, and *P* values less than 0.05 were considered significant. Data pertaining to statements in Sections B and C of the survey were described as number (percentage), with 95% confidence intervals (95% CIs) calculated around proportions. To assess levels of agreement among therapists within each statement, we evaluated the percentage of participants who marked strongly agree or agree to each statement. Using the same approach that we adopted in previous research (28), we defined 100% as unanimity, 75–99% as consensus, 51–74% as majority view, and 0–50% as no consensus. To compare response distributions of therapist perceptions of exercise delivered over the telephone and by video over the internet, we examined the confidence intervals for proportions who agreed/strongly agreed for each mode of service delivery. Where confidence intervals did not overlap, we assumed that there was a significant difference in the proportions who agreed with each statement for the 2 service models.

Exploratory logistic regression models were fitted to investigate whether a physical therapist’s characteristics influenced their response to the statement “I would be interested in being involved in a service offering physical therapist–prescribed exercise over the telephone/via video over the internet for people with OA.” Therapists were classified as being either in agreement (i.e., marked strongly agree or agree) or not in agreement (i.e., marked unsure, disagree, or strongly disagree) with this statement. Univariate logistic regression models for these outcomes were fit, including each of the dependent variables of sex, work setting, geographical location of clinic, frequency of treating patients with OA, frequency of prescribing exercise for patients with OA, confidence using video internet technologies, previous experience delivering care remotely, whether or not they currently deliver care

remotely for any patients, and their beliefs about the cost of telephone and video services for people with OA. Some response categories for geographical location of the clinic, frequency treating patients with OA, frequency of prescribing exercise to people with OA, and confidence using video internet technology were grouped together due to small numbers of responses in some categories.

RESULTS

Characteristics of the participants. Of the 255 people who began the survey, 217 gave complete responses (i.e., reached the end of the survey), 29 were incomplete (i.e., did not reach the end of the survey), and 9 did not meet inclusion criteria. Therapists who gave incomplete responses were significantly less likely to have postgraduate qualifications than those who gave complete responses ($P = 0.028$ by Pearson chi-square).

The cohort (Table 1) comprised 72% women, and 60% of all participants worked exclusively in private health care, which is reflective of the Australian physical therapy workforce (where 67% of employed therapists are women, and 62% work in private practice settings [37]). Approximately one-third of therapists (32%) practiced outside of metropolitan cities, which also reflects the broader Australian physical therapy workforce (20% employed outside of major cities [38]). All but one state/territory of Australia was represented (Northern Territory). Over half of therapists (58%) treated patients with knee/hip OA very frequently, and most (77%) always prescribed exercise for these patients. A minority had previous experience with telerehabilitation, primarily in delivering care over the telephone (24%) rather than using video over the internet (11%). Although most respondents did not currently offer physical therapy services via the telephone or video in their clinical setting, a small proportion did (2–8%).

Perceptions of telephone-delivered care. There was consensus agreement with only 2 statements relating to telephone-delivered care (Table 2, Figure 1), which were: “A patient’s privacy would not be violated if I prescribed them an exercise program over the telephone” (81% of respondents agreed or strongly agreed), and “Receiving an exercise program from a physical therapist over the telephone would save the patient time” (76%). The majority of therapists agreed with a further 4 statements about telephone-delivered care, namely that an exercise program over the telephone would save a patient money (70%), would be an affordable way for patients to receive exercise (64%),

would be a convenient form of health care for an OA patient (61%), and that physical therapists could get a good understanding of a patient's OA over the telephone (53%). There was no consensus agreement with the remaining 10 statements. In particular, only 8% of respondents agreed that they would like the lack of physical contact when consulting over the telephone. Most therapists (76%) believed that a telephone consultation should cost the same or 25% less than the cost of a face-to-face session, although 20% believed that it should cost 50% less (Table 3).

Perceptions about video-delivered care. Fifteen of 16 statements about video-delivered care (Table 2, Figure 1) reached at least majority agreement (>50% of respondents in agreement), 3 of which reached consensus agreement (75–99% of respondents in agreement). Statements for which there was consensus agreement related to video-based care saving the patient time (82% agreed or strongly agreed), being a convenient form of health care for an OA patient (80%), and not violating a patient's privacy (75%). Only 1 statement about video-based care failed to reach at least majority agreement, where only 14% of respondents agreed or strongly agreed that they liked that there would be no physical contact when consulting via video. Similar to telephone-based care, most therapists (85%) believed a video consultation should cost the same or 25% less than the cost of a face-to-face session (Table 3).

Physical therapists displayed a preference for video-delivered care, with significantly more therapists being in agreement with 10 of 16 statements relating to video-delivered care compared to telephone-based care. These included the statements regarding getting an understanding of a patient's OA (74% [95% CI 68–80] agreement for video versus 53% [95% CI 46–60] for telephone), being easy to use (63% [95% CI 57–69] versus 30% [95% CI 24–36], respectively), being as satisfied as consulting in-person (57% [95% CI 51–63] versus 29% [95% CI 24–36]), improving a patient's OA (70% [95% CI 62–75] versus 43% [95% CI 37–50]), being able to adequately monitor a patient's OA (62% [95% CI 55–69] versus 35% [95% CI 29–41]), being convenient for an OA patient (80% [95% CI 75–86] versus 61% [95% CI 55–67]), being acceptable (62% [95% CI 55–69] versus 41% [95% CI 34–48]), being useful (practical) (66% [95% CI 60–72] versus 42% [95% CI 36–50]), being effective (51% [95% CI 45–58] versus 23% [95% CI 18–29]), and being safe (55% [95% CI 49–61] versus 26% [95% CI 19–31]).

Characteristics influencing interest in delivering telerehabilitation. Only 1 independent variable was associated with interest in delivering telephone services (Table 4). Having low confidence using internet video technologies was associated with reduced odds of being interested in providing telephone-delivered care, relative to being quite confident (odds ratio [OR] 0.4 [95% CI 0.2–0.8]). For video-based care, 2 independent variables were significantly associated with interest in delivering such services, with another reaching border-line significance (Table 5). Being not at all, or a little, confident using video internet technologies, relative to quite confident (OR 0.2 [95% CI 0.1–0.6]) and having no previous experience delivering telerehabilitation, relative to having previous experience (OR 0.4 [95% CI 0.2–0.8]), were both associated with decreased odds of having an interest in providing video-delivered care.

DISCUSSION

This study aimed to investigate the perceptions of physical therapists about the remote delivery of exercise therapy for people with knee and/or hip OA. For both video- and telephone-delivered services, there was consensus agreement among our sample of physical therapists that both would save patients time, and maintain patient privacy, but few agreed that they would like the lack of physical contact with patients. Overall, physical therapists held more positive perceptions of video-delivered care compared to telephone care, with more than half of all attitude statements about telephone care failing to achieve majority agreement. Low confidence using internet video technologies, and having no prior experience with telerehabilitation, were significantly associated with reduced interest in delivering either telephone and/or video-based services.

Overall, physical therapists in our study appeared to hold positive perceptions about using internet video technologies to deliver care to people with OA. Therapists were in majority agreement with 15 of 16 perception statements, with more than 75% agreeing that such services would be time-saving, privacy-protecting, and convenient for people with OA. These findings broadly reflect previous quantitative studies investigating physical therapists' satisfaction with using sophisticated videoconferencing software to deliver care to people who have undergone total knee arthroplasty in research settings (29,30,39,40). Collectively, these previous studies found therapists were satisfied with the patient-therapist relationship and attainment of therapeutic goals (41) as well as the convenience and usefulness of video-delivery (40). While physical therapists in previous studies believed that the video technology

was easy and safe to use (29,30), more than one-third (37–45%) of our survey sample did not agree that using video technologies to deliver care would be easy, or that it would be a safe way for patients to receive an exercise program. This result might be because only 11% of our cohort had any previous experience delivering video-based care, in contrast to the prior studies where physical therapists had first-hand experiences to reflect upon. Therapists' perceptions about video-delivered care align with those of people with OA (28), who achieved consensus agreement that video-based care would be time-saving, convenient, and easy to use, and would protect their privacy.

Although most physical therapists also agreed telephone-delivered care would maintain a patient's privacy and save the patient time, fewer therapists agreed with the other perception statements, relative to video. To our knowledge, no other studies have investigated the perceptions physical therapists have toward telephone-delivery of exercise therapy for people with OA. A recent survey found that physical therapists and general practitioners in the UK have overall positive attitudes towards the physical therapist-delivered telephone service PhysioDirect, which is run by the National Health Service and provides initial assessment and advice to people with musculoskeletal conditions (42). However, their survey comprised only 6 items and did not capture clinician's beliefs about the specific advantages or disadvantages of telephone-delivered care. Qualitative interviews with PhysioDirect therapists revealed that most would be interested in delivering a similar service in the future, believing that it was a valuable service that can reduce patient waiting times (27). Interestingly, people with hip and/or knee OA hold more positive perceptions of telephone-delivered physical therapist-prescribed exercise (28) than the physical therapists in our sample. Our prior research showed at least majority agreement among people with OA, with 13 of 17 perception statements (76%), while therapists reached majority agreement on only 6 of 16 statements (38%). Why these differences exist is not clear from our survey, and thus further qualitative explorations are necessary.

Although there is some evidence that telephone-delivered physical therapist advice and management for people with musculoskeletal conditions (27), including OA (26), is as effective as usual care, therapists in our study did not reach majority agreement on statements relating to the acceptability, effectiveness, usefulness, and safety of this delivery mode. While general practitioners and physical therapists who were surveyed about PhysioDirect held overall positive attitudes about the service, the majority believed that most patients would

still need to be seen face-to-face (42). This belief is despite a pragmatic randomized controlled trial showing that PhysioDirect is equally clinically effective, compared with usual waiting-list-based care, provides faster access to treatment, and appears to be safe and acceptable to patients (27). Qualitative interviews with PhysioDirect therapists revealed that, before delivering the service, many held concerns about accurately diagnosing patients and communicating effectively via telephone (27). There is also evidence that general practitioners experience dissatisfaction when consulting with patients via telephone, being concerned about the absence of visual cues and being unable to confirm the diagnosis with an examination (43), and possibly our physical therapists hold similar concerns.

Less than 15% of therapists agreed that they would like the lack of physical contact with patients when consulting via video or telephone, which also broadly reflects the perceptions of people with OA (28). It is not clear why therapists feel this way, given that self-management advice and exercise are the recommended core components of physical therapy for all people with OA, and that manual therapies are only recommended as adjunct treatments for some patients (44). As physical therapy is traditionally regarded as a hands-on profession (45), and as physical therapists frequently use touch to communicate with and connect to their patients (32–34), therapists may feel their usual communication style will be hampered by telerehabilitation. Therapists' negative perceptions about the lack of physical contact may also reflect the fact that they are not traditionally trained to provide care remotely, and so may not feel confident in being able to deliver care safely and effectively. Our data support this assumption, as we found that no experience with telerehabilitation was associated with decreased odds of having an interest in providing video-delivered care, and that low confidence using internet video technologies was associated with decreased odds of having an interest in providing both telephone and video-delivered services. This suggests that many physical therapists may require specific training, and practice, in providing telerehabilitation care. In fact, physical therapists who deliver care via the PhysioDirect telephone service are required to complete specialized training to become proficient in assessing patients and providing care remotely (46). Future studies should investigate the reasons why physical therapists are uncomfortable about the lack of physical contact with telerehabilitation, and whether these perceptions can be shifted following specialized training in the remote delivery of care. Surprisingly, as many as 8–14% of respondents agreed that they would like the lack of physical contact when consulting via telerehabilitation. Although this finding could reflect misinterpretation of the positively framed survey statements, it may

also indicate that not all therapists like physical contact with patients, perhaps due to occupational hazards (thumb pain) of manual therapy techniques (47,48).

Strengths of the current study include the number of physical therapists who completed the survey, who were recruited Australia-wide, representing all but one state/territory, and spanned clinical practice in metropolitan cities as well as rural towns. Our respondents were generalizable to the broader Australian physical therapy workforce, where 67% of employed physical therapists are female, 62% work in private practice (37), and 80% are employed in major cities (38). Other strengths include the broad range of attitude statements relating to both telephone and video modes of delivery, as well as explorations of the characteristics that influenced interest in delivering these services. Our study also had a number of limitations. Our survey data were collected in Australia, thus findings may not be generalizable to other countries where physical therapists may have more exposure to telerehabilitation services. Our recruitment methods meant that we had no information about response rate, and so we do not know whether responders were significantly different from nonresponders. We note that our method of using overlap of confidence intervals to ascertain whether there were significant differences between perceptions of telephone and video-based care is conservative, and that significant differences may exist even with overlapping confidence intervals (49). We only surveyed physical therapists, and future research should investigate the perceptions of other providers of exercise management for people with OA (e.g., exercise physiologists), as they may hold more favorable perceptions of telerehabilitation service models.

In conclusion, physical therapists agree that telerehabilitation offers time-saving and privacy advantages for people with OA, and perceive video-delivered care more favorably than telephone-delivered services. However, most do not like the lack of physical contact with either service model. Low confidence using internet video technologies, and having no prior experience with telerehabilitation, were significantly associated with reduced interest in delivering either telephone and/or video-based services. These findings contribute towards the development and implementation of future telerehabilitation services for people with hip/knee OA.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Hinman had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Lawford, Bennell, Kasza, Hinman.

Acquisition of data. Lawford.

Analysis and interpretation of data. Lawford, Bennell, Kasza, Hinman.

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Figure 1. Percentage of survey respondents who agree or strongly agree with perception statements relating to telerehabilitation. PT = physical therapist; OA = osteoarthritis.

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Table 1. Demographic and clinical characteristics of respondents (n = 217)*

Characteristic	Value
Sex	
Women	156 ± 72
Men	60 ± 28
Clinical experience, mean ± SD (range) years	15.3 ± 12.1 (0–47)
Postgraduate qualifications	
Yes	91 ± 42
No	126 ± 58
Work setting	
Public health system	58 ± 27
Private health system	129 ± 60
Both public and private	22 ± 10
Other	7 ± 3
Clinical practice, mean ± SD (range) hours/week	31.7 ± 12.3 (1–76)
Main focus of clinical work	
Musculoskeletal outpatients	148 ± 69
Musculoskeletal inpatients	9 ± 4
Both musculoskeletal inpatients and outpatients	15 ± 7
Neurologic patients	5 ± 2
Other	39 ± 18
Geographic location of clinical practice†	
Metropolitan city (population ≥250,000)	147 ± 68
Regional city/town (population 18,000 to 249,999)	39 ± 18
Rural town (population 5,000 to 17,999)	26 ± 12
Remote town (population <5,000)	4 ± 2
Frequency of treating patients with knee/hip OA	
Infrequently (≤1 in the last 6 months)	7 ± 3
Somewhat frequently (2–5 in the last 6 months)	29 ± 14
Frequently (≥1 patient/month)	54 ± 25
Very frequently (≥1 patient/week)	126 ± 58
Frequency of prescribing exercise for patients with hip/knee OA	

Occasionally (to a minority of patients)	1 ± 1
To approximately 50% of patients	8 ± 4
Usually (to most patients)	40 ± 18
Always (to all patients)	167 ± 77
Previous experience with telerehabilitation	
No	154 ± 71
Yes, over the phone	52 ± 24
Yes, via video over the internet	23 ± 11
Confidence using video chat service over the internet	
Not at all	12 ± 5
A little	38 ± 18
Moderately	66 ± 31
Quite a bit	58 ± 27
Extremely	42 ± 19
Currently offer PT services by telephone	
No	198 ± 92
Yes	18 ± 8
Currently offer PT services via internet video	
No	209 ± 98
Yes	5 ± 2
<p>* Values are the mean ± SD, unless indicated otherwise. Individual items may not add to totals due to missing data. OA= osteoarthritis; PT = physical therapy.</p> <p>† City/town categories were defined according to the Australian Statistical Geography Standard Remoteness Structure (http://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure).</p>	

Table 2. Therapists' perceptions of telerehabilitation for exercise management of patients with knee and/or hip osteoarthritis (n = 217)*						
Statement	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	Missing data, no. (%)
Exercise is beneficial for OA.	187/86 (81–91)	26/12 (8–17)	1/1 (0–2)	0/0 (0–0)	0/0 (0–0)	3 (1)
I would get a good understanding of a patient's OA over the _____.						
Telephone	8/4 (1–6)	106/49 (42–56)	62/28 (24–35)	30/14 (9–19)	11/5 (2–8)	0 (0)
Internet video	37/17 (12–22)	123/57 (51–64)	37/17 (12–22)	14/7 (3–11)	5/2 (1–4)	1 (0)
A patient's privacy would not be violated if I prescribed them an exercise program over the _____.						
Telephone	67/31 (25–38)	109/50 (42–57)	26/12 (8–17)	9/4 (1–7)	6/3 (1–5)	0 (0)
Internet video	49/23 (18–28)	112/52 (46–58)	40/18 (13–25)	11/5 (3–8)	3/1 (0–3)	2 (1)
Using the _____ to consult with an OA patient and prescribe an exercise program would be easy for me.						
Telephone	10/5 (2–8)	55/25 (21–32)	77/35 (29–42)	56/26 (21–32)	17/8 (5–12)	2 (1)
Internet video	25/12 (7–16)	111/51 (47–58)	56/26 (21–32)	14/6 (4–10)	8/4 (2–7)	3 (1)
I would be as satisfied talking to an OA patient over the _____ as I would be talking to the patient in person in my consulting room.						
Telephone	12/5 (2–9)	53/24 (19–30)	34/16 (11–21)	89/41 (34–48)	28/13 (8–18)	1 (1)

Internet video	30/14 (9–18)	93/43 (37–50)	38/18 (12–23)	42/19 (14–25)	14/6 (3–10)	0 (0)
An exercise program prescribed by a PT over the _____ would improve a patient's OA.						
Telephone	9/4 (2–7)	85/39 (33–46)	97/45 (38–51)	15/7 (4–10)	9/5 (2–7)	1 (0)
Internet video	31/14 (10–19)	120/56 (50–62)	51/24 (18–30)	9/4 (2–7)	5/2 (1–5)	1 (0)
An exercise program prescribed by a PT over the _____ would save a patient money.						
Telephone	31/14 (11–19)	120/56 (49–62)	46/21 (16–27)	15/7 (4–11)	4/2 (0–4)	1 (0)
Internet video	29/13 (9–18)	114/55 (48–62)	52/24 (19–29)	13/6 (3–9)	4/2 (1–4)	0 (0)
I would be able to adequately monitor a patient's OA over the _____.						
Telephone	5/2 (1–4)	72/33 (28–39)	64/30 (24–35)	58/27 (20–33)	17/8 (5–12)	1 (0)
Internet video	24/11 (7–15)	110/51 (44–57)	50/23 (18–29)	23/11 (7–15)	9/4 (2–7)	1 (0)
I like that there would be no physical contact with an OA patient when consulting over the _____.						
Telephone	4/2 (1–4)	13/6 (3–10)	25/11 (7–16)	112/54 (47–61)	57/26 (21–33)	2 (1)
Internet video	5/2 (1–4)	25/12 (7–16)	32/15 (10–20)	120/55 (48–63)	34/16 (11–21)	1 (0)
Receiving an exercise program from a PT over the _____ would be a convenient form of health care for an OA patient.						
Telephone	19/9 (5–13)	113/52 (46–60)	53/24 (20–31)	20/9 (6–14)	10/5 (2–8)	2 (1)
Internet video	46/21 (16–27)	129/59 (54–67)	27/13 (9–18)	7/3 (1–6)	5/3 (1–5)	2 (1)

Receiving an exercise program from a PT over the _____ would save the patient time.						
Telephone	31/14 (10–20)	136/62 (58–70)	27/13 (8–17)	18/9 (5–12)	3/1 (0–3)	2 (1)
Internet video	44/20 (15–27)	134/62 (57–68)	24/11 (7–16)	9/4 (2–7)	4/2 (1–4)	2 (1)
I would be interested in being involved in a service offering PT-prescribed exercise over the _____ for my people with OA.						
Telephone	25/12 (8–17)	71/33 (27–39)	59/27 (21–33)	40/18 (14–23)	20/10 (7–15)	0 (0)
Internet video	38/18 (13–23)	85/39 (34–48)	53/25 (19–29)	24/11 (7–15)	14/6 (4–10)	3 (1)
Using the _____ would be an acceptable way for me to deliver an exercise program to patients with OA.						
Telephone	11/5 (2–8)	78/36 (29–42)	47/22 (15–28)	55/25 (19–31)	25/12 (7–16)	1 (0)
Internet video	33/15 (11–20)	102/47 (40–55)	46/21 (17–27)	18/8 (5–12)	14/7 (4–10)	4 (2)
Using the _____ would be a useful (practical) way for me to deliver an exercise program to patients with OA.						
Telephone	15/7 (4–11)	76/35 (29–42)	47/21 (17–28)	56/26 (20–33)	19/9 (5–13)	4 (2)
Internet video	31/14 (10–19)	112/52 (45–58)	41/19 (15–24)	21/10 (6–14)	12/5 (3–9)	0 (0)
Using the _____ would be an effective way for me to deliver an exercise program to patients with OA.						
Telephone	5/2 (1–5)	45/21 (15–28)	82/38 (31–44)	54/25 (19–30)	30/14 (9–19)	1 (0)

Internet video	24/11 (7–16)	87/40 (34–47)	66/30 (25–37)	23/11 (7–16)	13/6 (3–9)	4 (2)
Using the _____ would be an affordable way for patients to receive a PT-prescribed exercise program for their OA.						
Telephone	22/10 (6–15)	118/54 (48–61)	55/26 (21–32)	14/7 (4–10)	5/2 (1–5)	3 (1)
Internet video	32/15 (10–19)	126/58 (51–65)	47/22 (17–27)	6/3 (1–5)	4/2 (1–5)	1 (0)
Using the _____ would be a safe way for patients to receive a PT-prescribed exercise program for their OA.						
Telephone	9/4 (2–7)	47/22 (16–27)	76/35 (29–42)	53/25 (19–31)	31/14 (10–18)	1 (0)
Internet video	27/12 (8–17)	92/43 (36–49)	59/27 (21–34)	25/12 (7–16)	13/6 (3–9)	1 (0)
* Values are the number/percentage (95% confidence interval) unless indicated otherwise. PT = physical therapist; OA = osteoarthritis.						

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Table 3. Therapists' perceptions of telerehabilitation costs for exercise management of patients with knee and/or hip osteoarthritis, compared with face-to-face PT session (n = 217)*

A session of PT-prescribed exercise over the ____ for people with OA should cost patients...		
Cost perception	Telephone	Internet video
50% more	2/1 (0–3)	3/1 (0–3)
25% more	7/3 (1–6)	12/6 (3–9)
Same	85/39 (33–46)	105/49 (42–56)
25% less	80/37 (31–44)	78/36 (30–43)
50% less	42/20 (15–26)	18/8 (6–13)
Missing data, no. (%)	1 (0)	1 (0)

* Values are the number/percentage (95% confidence interval) unless indicated otherwise.
PT = physical therapist; OA = osteoarthritis.

Table 4. Influence of therapist characteristics on interest in offering physical therapist-prescribed exercise over the telephone for knee or hip OA*

	Agree	Disagree	OR (95% CI)	<i>P</i>
Sex				
Women	64 (41)	92 (59)	0.7 (0.4–1.2)	0.16
Men	31 (52)	29 (48)	1.0 (ref.)	–
Work setting				
Private practice	62 (48)	67 (52)	1.6 (0.9–3.1)	0.13
Public practice	21 (36)	37 (64)	1.0 (ref.)	–
Combination public and private	11 (50)	11 (50)	1.8 (0.7–4.8)	0.26
Other	2 (29)	5 (71)	0.7 (0.1–4.0)	0.69
Geographical location of clinic				
Rural town/remote town	14 (47)	16 (53)	1.2 (0.6–2.7)	0.60
Regional town/city	20 (51)	19 (49)	1.5 (0.7–3.0)	0.28
Metropolitan city	61 (42)	86 (59)	1.0 (ref.)	–
Frequency of treating patients with knee/hip OA				
Infrequently/somewhat frequently	13 (36)	23 (64)	0.7 (0.3–1.6)	0.34
Frequently	25 (46)	29 (54)	1.0 (ref.)	–
Very frequently	57 (45)	69 (55)	1.0 (0.5–1.8)	0.90
Frequency of prescribing exercise for patients with hip and/or knee OA				
Occasionally to approximately 50%	4 (44)	5 (56)	1.1 (0.3–4.6)	0.92
Usually, to most patients	17 (43)	23 (58)	1.0 (ref.)	–
Always, to all patients	74 (44)	93 (56)	1.1 (0.5–2.2)	0.84
Confidence using video internet technologies				
Not at all/a little	14 (28)	36 (72)	0.4 (0.2–0.8)	0.01
Moderately	32 (49)	34 (52)	0.9 (0.4–1.8)	0.72
Quite a bit	30 (52)	28 (48)	1.0 (ref.)	–
Extremely	19 (45)	23 (55)	0.8 (0.3–1.7)	0.52

Previous experience delivering care via telerehabilitation				
No	62 (40)	92 (60)	0.6 (0.3–1.1)	0.08
Yes, either over the telephone or via video	33 (53)	29 (47)	1.0 (ref.)	–
Currently providing care via telephone or internet video				
No	83 (43)	112 (57)	0.6 (0.2–1.4)	0.21
Yes, either over the telephone or via video	12 (57)	9 (43)	1.0 (ref.)	–
Belief about cost of telephone-delivered care				
25–50% more than face-to-face	2 (100)	0 (0)	0.8 (0.2–3.5)	0.80
Same as face-to-face	32 (38)	53 (62)	1.0 (ref.)	–
25% less than face-to-face	42 (53)	38 (47)	1.8 (1.0–3.4)	0.06
50% less than face-to-face	18 (43)	24 (57)	1.2 (0.6–2.6)	0.57
* Values are the number (%) unless indicated otherwise. OA = osteoarthritis; OR = odds ratio; 95% CI = 95% confidence interval.				

Table 5. Influence of therapist characteristics on interest in offering physical therapist-prescribed exercise via internet video for knee or hip OA*				
	Agree	Disagree	OR (95% CI)	<i>P</i>
Sex				
Women	85 (56)	68 (44)	0.8 (0.4–1.4)	0.42
Men	37 (62)	23 (38)	1.0 (ref.)	–
Work setting				
Private practice	79 (62)	49 (38)	1.5 (0.8–2.8)	0.21
Public practice	29 (52)	27 (48)	1.0 (ref.)	–
Combination public and private	13 (59)	9 (41)	1.3 (0.5–3.7)	0.56
Other	2 (29)	5 (71)	0.4 (0.1–2.1)	0.26
Geographical location of clinic				
Rural town/remote town	18 (62)	11 (38)	0.8 (0.3–1.7)	0.50

Regional town/city	24 (62)	15 (39)	1.0 (0.4–2.6)	0.96
Metropolitan city	80 (55)	65 (45)	1.0 (ref.)	–
Frequency of treating patients with knee/hip OA				
Infrequently/somewhat frequently	20 (57)	15 (43)	1.1 (0.5–2.5)	0.88
Frequently	30 (56)	24 (44)	1.0 (ref.)	–
Very frequently	72 (58)	52 (42)	1.1 (0.6–2.1)	0.76
Frequency of prescribing exercise for patients with hip and/or knee OA				
Occasionally to approximately 50%	4 (44)	5 (56)	1.0 (0.2–4.5)	0.96
Usually, to most patients	17 (44)	22 (56)	1.0 (ref.)	–
Always, to all patients	101 (61)	64 (39)	2.0 (1.0–4.1)	0.05
Confidence using video internet technologies				
Not at all/a little	17 (35)	31 (65)	0.2 (0.1–0.6)	≤ 0.001
Moderately	40 (62)	25 (39)	0.7 (0.3–1.5)	0.39
Quite a bit	40 (69)	18 (31)	1.0 (ref.)	–
Extremely	25 (60)	17 (41)	0.7 (0.3–1.5)	0.33
Previous experience delivering care via telerehabilitation				
No	79 (52)	74 (48)	0.4 (0.2–0.8)	0.01
Yes, over the phone or via video	43 (72)	17 (28)	1.0 (ref.)	–
Currently providing care via telephone or internet video				
No	108 (56)	84 (44)	0.6 (0.2–1.7)	0.36
Yes, either over the telephone or via video	14 (67)	7 (33)	1.0 (ref.)	–
Beliefs about the cost of video-delivered care				
25–50% more than face-to-face	2 (67)	1 (33)	1.4 (0.5–4.1)	0.58
Same as face-to-face	55 (52)	50 (48)	1.0 (ref.)	–
25% less than face-to-face	47 (63)	28 (37)	1.5 (0.8–2.8)	0.17
50% less than face-to-face	11 (61)	7 (39)	1.4 (0.5–4.0)	0.49
* Values are the number (%) unless indicated otherwise. OA = osteoarthritis; OR = odds ratio; 95% CI = 95% confidence interval.				

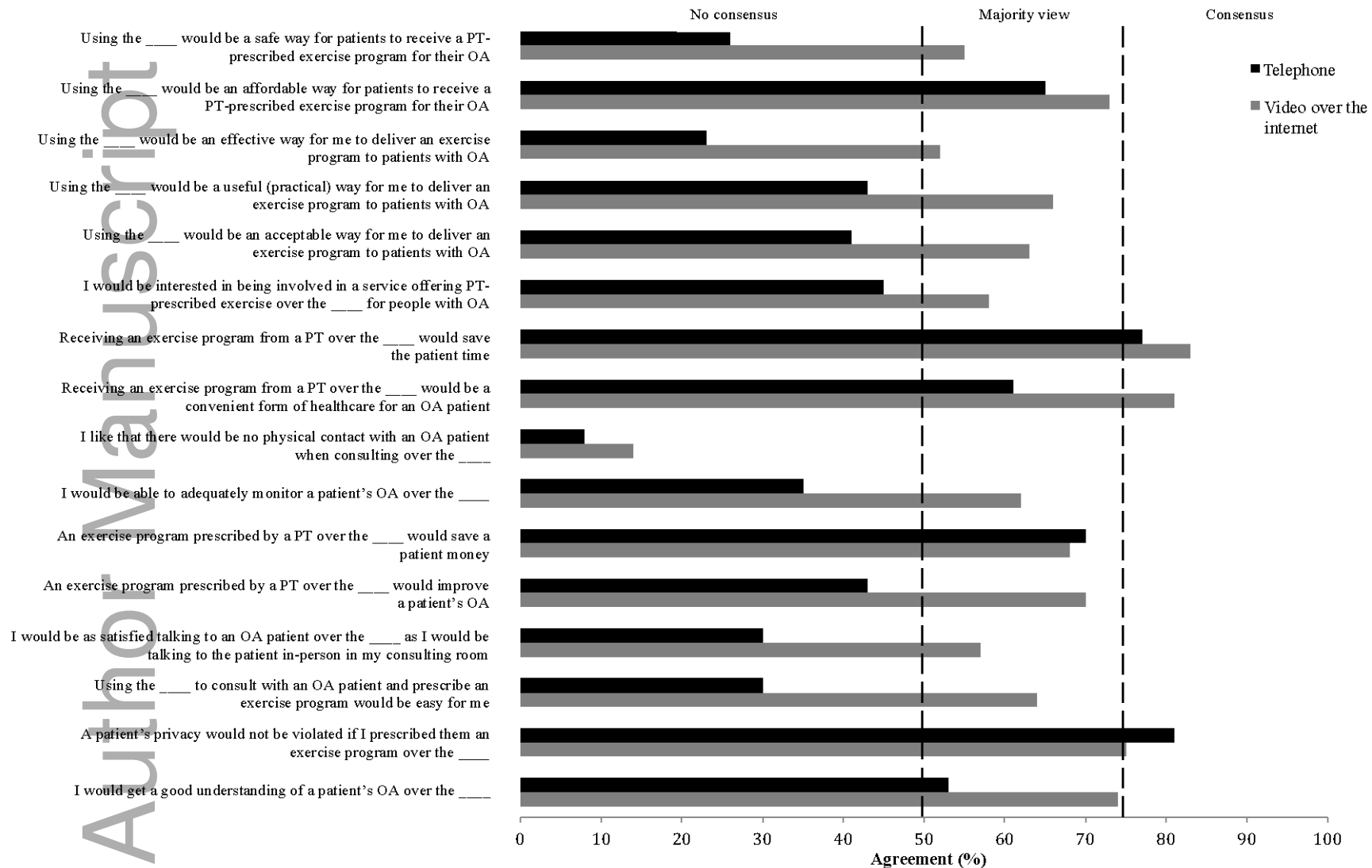


Figure 1. Percentage of survey respondents that agree or strongly agree with perception statements relating to telerehabilitation

PT: physical therapist; OA: osteoarthritis

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